Case - 2

1/

Mango, Standard processing time = 3 (a)

Annual demand = 1400000 (b)

Requires process = 420000 (a×b)

Orange, a = 4, b = 120000, (a×b) = 480000 min

Papaya, a = 3, b = 80000, (a×b) = 240000 min.

∴ Total required time = (420000 + 480000 + 240000) min

$\simeq 1140000$ min

$\simeq 19000$ hour.

∴ Total machine need = $\frac{\text{Total required time}}{\text{Total available time}}$

$= \frac{19000}{8 \times 240} \simeq 9.895 \simeq 10$ machines.

2/ Comany have 5 machines, need more 5 extra.

∴ Total available time = 8 × 240 = 1920 hour (100% eff)

for 80% eff, total available time = 1920 × 0'8 = 1536 hour.

Hence, Total machine required = $\frac{\text{Total required time}}{\text{Total available time}}$

$= \frac{19000}{1536} = 12'36 \approx 13$ machines.

Increase 10% efficiency,

∴ 90% total available time = (1920 × 0'9) = 1728 hour.

∴ Total machine required = $\frac{19000}{1728} = 10'99 \approx 11$ machines.

∴ Company need = (11 − 5) = 6 extra machine.

3/

		house production	Buy from supplier
FC	Fixed cost	25000 per month	
V	variable cost	2 per pack	
R	Purchasing cost		5 per pack
Q	Demand	340000 per year	340000 per y.
		28333 P. month	28333 P.m

Q(BEP) = FC/R−V = 25000/(5−2) = 8333 Pack per month

∴ Total house production = FC + V(Q) = 25000 + 2(8333) = 41666 BDT

∴ Total suppliers cost = R(Q) = 5 × 28333 = 141665 BDT

1

① $$\text{Utilization} = \left(\frac{\text{Actual output}}{\text{Design capacity}}\right) \times 100\%$$

② $$\text{Efficiency} = \left(\frac{\text{Actual output}}{\text{Effective capacity}}\right) \times 100\%$$

a) Given, Actual output = 7 loans/day

Design capacity = 10 loans/day

Effective capacity = 8 loans/day.

$$\therefore \text{Utilization} = \frac{7}{10} \times 100\% = 70\%$$

$$\therefore \text{Efficiency} = \frac{7}{8} \times 100\% = 87.5\%$$

Ans.

b) Actual output = 4 furnaces/day

Design capacity = 6 "/day

Effective capacity = 5 "/day

$$\therefore \text{Utilization} = \frac{4}{6} \times 100\% \simeq 66.67\%$$

$$\therefore \text{Efficiency} = \frac{4}{5} \times 100\% = 80\%$$

Ans.

2

Effective capacity = 50% of design

Actual output = 80% of Effictive cap.

Required actual output = 8 Jobs/week

∴ Effective capacity = 50 of x

$= 0.5x$

∴ Actual output $= 0.8 \times 0.5x = 0.4x$

∴ Actual output must 8 Jobs/week

$0.4x = 8$

$\therefore x = \frac{8}{0.4} = 20$

∴ Design capacity = 20 Jobs/week.

3// ⑤

FC = 9200/month

VC = 0.70/unit

SP = 0.90/unit

∴ Total revinue = Total cost

$SP \cdot Q = FC + VC \cdot Q$

$\Rightarrow 0.90Q = 9200 + 0.70Q$

Subtract 0.70Q from both,

$0.20Q = 9200$

$\Rightarrow Q = \frac{9200}{0.20} = 46000$ units

Ans.

b) Profit for 61000 and 87000 units.

Profit = Total revinue - Total cost

$= (SP \cdot Q) - (FC + VC \cdot Q)$

$= (0.90 \cdot 61000) - (9200 + 0.70 \cdot 61000)$

$= 3000$

For 87000 units.

$\text{Profit} = (0.90 \times 87000) - (9200 + 0.70 \times 87000)$

$= 8200$

c) Volume for 16000 profit;

$\text{profit} = (SP \cdot Q) - (FC + VC \cdot Q)$

$\Rightarrow 16000 = 0.90Q - 9200 - 0.70Q$

$\Rightarrow Q = \frac{25200}{0.20} = 126000$ units.

d) volume for 23000 revenue,

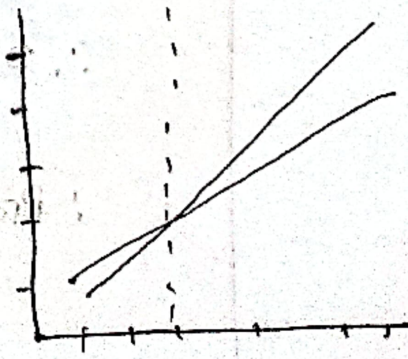
Revinue $= SP \cdot Q$

$\Rightarrow 23000 = 0.90Q$

$\Rightarrow Q = \frac{23000}{0.90} \simeq 25,556$ units.

e) Total revenue $TR(Q) = 0.90Q$

Total cost, $TC(Q) = 9200 + 0.70Q$



4// Fixed cost = 40000 (A) , 30000 (B)

variable cost = $10 (A) , $11 (B)

selling price = $15 (A) , $15 (B)

a) Break-even quantity (A) $= \frac{\text{Fixed cost}}{\text{Sell price} - \text{variable cost}}$

$= \frac{40000}{15-10}$

$= 8000$ units.

∴ (B) $Q_B = \frac{30000}{15-11} = 7500$ units.

Ans.

b) Profit A $= (15-10)Q - 40000 = 5Q - 40000$

Profit B $= (15-11)Q - 30000 = 4Q - 30000$

∴ $5Q - 40000 = 4Q - 30000$

$\Rightarrow Q = 10000$

c) Profit of 12000 units,

∴ Profit A $= \$12000 - 40000 = 20000$

∴ Profit B $= \$12000 - 30000 = 18000$

Ans.

5// Forecasted demand = 30000 Pens.

FC = 25000 /month.

VC = 0.37 $

SP = $ 1

Target profit = $15000

a) Break even quantity = $\frac{\text{Fixed cost}}{\text{selling P} - \text{VC}}$

$= \frac{25000}{1.00 - 0.37} \simeq 39,683$ Pens.

Ans.

b) selling price for 15000

$\therefore$ Profit = (SP − VC) Q − FC

$\Rightarrow 15000 = (SP - 0.37) \cdot 30000 - 25000$

$\Rightarrow SP - .37 = \frac{40000}{30000} = 1.3333$

$\Rightarrow SP = 1.7033$

6// A = $20 (monthly fee), (0.45/min, 0.20 min

B = $ 20 , $ 0.35/min , $0.15/min.

C = $ 80 .

For A. Total = $20 + (120 × 0.45) + (40 × 0.20) = $82

For B, Total = $20 + (120 × 0.55) + (40 × 0.15) = $92

For C, Total = $80 Flat

c)

compare A and C plan,

$$20 + 0.45x = 80 \text{ (up to 200 min)}$$

$$\Rightarrow 0.45x = 60$$

$$\Rightarrow x = 133.33 \text{ mins.}$$

compare B and C,

$$20 + 0.55x = 80$$

$$\Rightarrow x = 109.09 \text{ mins.}$$

Compare A and B,

$$20 + 0.45x = 20 + 0.55x$$

$$\Rightarrow x = 0$$

d) Day munites $= xT$

Evening " $= (1-x)T$

∴ Total cost equal,

$$20 + 0.45(xT) + 0.20((1-x)T) = 20 + 0.55(xT) + 0.15(1$$

Remove 20 from both,

$$0.45 + 0.20T - 0.20xT = 0.55xT + 0.15T - 0.15xT$$

∴ simplify, $(0.25xT + 0.20T) = (0.40xT + 0.15T)$

$$\Rightarrow x = \frac{-0.05T}{-0.15T} = \frac{1}{3}$$

Ans

Case - 4

Given data,

monthly demand $D = 3000$ kg

cost $C = 60$

order cost $S = 20,000$

Year Holding cost $H = 30 \times 12 = 360$

Annual demand $= 3000 \times 12 = 36000$ kg.

$$\therefore EOQ = \sqrt{\frac{2 \times D \times S}{H}}$$

$$= \sqrt{\frac{2 \times 36000 \times 20000}{360}}$$

$$= \sqrt{\frac{1440000000}{360}}$$

$$= 2000 \text{ kg}.$$